Trend Study 16B-17-99

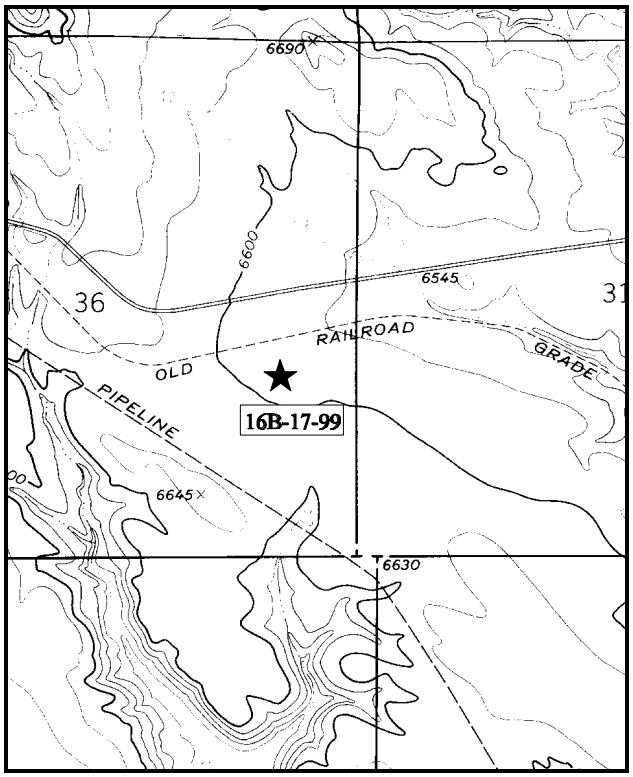
Study site name: Slackpile . Range type: Big Sagebrush - Grass .

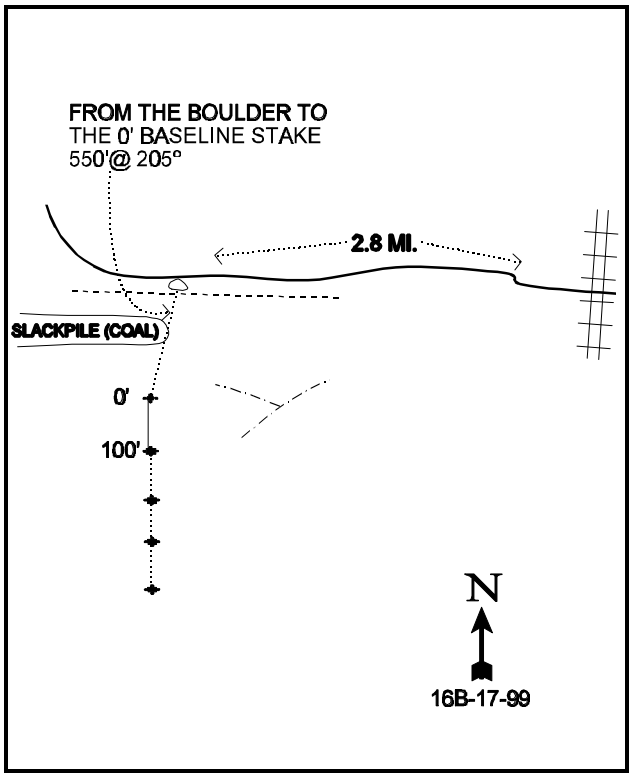
Compass bearing: frequency baseline 165°M- Line 1 & 2; 163°M- Line 3 & 4.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

On US 6 north of Helper, turn west onto Consumers Road. Proceed west 3.2 miles to the railroad tracks. Cross the tracks and continue 2.8 miles to a large boulder on the left. The study is located in the sagebrush south of the fence. Walk 550 feet at 190°M from the boulder to the start of the frequency baseline. The first stake is marked with a red browse tag, #9022.





Map Name: Standardville

Diagrammatic Sketch

Township 13S , Range 8E , Section 36

UTM 4388792.606 N, 502890.346 E

DISCUSSION

Trend Study No. 16B-17 (30-3)

The Slackpile study samples a representative sagebrush/grass site owned by the Division. The sagebrush/grass type covers an extensive part of the Gordon Creek range, an important wintering area for large numbers of deer. At the time of study establishment, the Division permitted spring cattle grazing, May 15 to June 15, with 150 AUMs on the south side of Consumers Road. Grazing has since been discontinued although trespass cattle were on the site when it was read in May of 1999. Currently, livestock use is moderately low with 23 cow days use/acre (57 cdu/ha) being estimated from the pellet group transects. Use by deer is moderately high with an estimated 65 deer days use/acre (160 ddu/ha) being estimated in 1999.

The study is at 6,600 feet in elevation on an 8% north-facing slope. Soil texture is a loam with a slightly alkaline pH (7.5). The surface is very hard with a crust present. The formation of cracks is occurring with the drying of the soil surface. The soil is moderately deep with an estimated effective rooting depth of 18 inches. There are very few rocks or pavement on the surface or throughout the profile. The stoniness index is more a measure of the compaction of the profile than actual presence of rock. There is a considerable amount of bare ground on the site, currently estimated at 43%. Pedestaling is present around the baseline stakes and shrub stems. Exposed roots and small gullies indicate some erosion problems on the site. Phosphorus (5.1 ppm) and potassium (44.8 ppm) are lower than the 10 ppm and 70 ppm that have been shown necessary for normal plant development and growth.

The various ecotypes and hybrids of big sagebrush in the area make plant classification difficult. On the study site, all big sagebrush were classified as Wyoming big sagebrush. Some black sagebrush was also encountered in 1994. Density for Wyoming big sagebrush has remained stable over all sampling years, and is estimated at 2,800 plants/acre in both 1994 and 1999. Cover for this species increased in 1999 to just over 7%. Browsing was heavy in 1988 when 44% of the Wyoming big sage displayed heavy use. Use was more moderate in 1994 with only 7% of the sagebrush displaying heavy use. Currently, utilization on sagebrush is high with 31% showing moderate use, and 42% displaying heavy use. Percent decadence has bounced around with each reading from 42% in 1988, to 57% in 1994, then decreasing to 36% in 1999. Ten percent of the population currently displays poor vigor. Biotic potential (number of seedlings) and recruitment have greatly decreased since the initial reading, currently at 0% and 9% respectively. Stickyleaf low rabbitbrush is the most abundant shrub in both cover and density and is currently estimated at 19,040 plant/acre, an increase of 34% since the 1994 reading. This is mostly a mature population with 23% of the plants showing moderate use. Broom snakeweed is also present, but after a large decrease due to drought during the previous reading, appears to be stabilizing at the present time.

Species richness of herbaceous vegetation is average for this range type with 7 grass and 7 forb species identified in 1994. The number of herbaceous species sampled in 1999 increased, with 7 grasses and 17 forbs present. However, most of the increase in forbs comes from species infrequently encountered. Bluebunch wheatgrass is the most abundant grass on the site with a quadrat frequency of 70% in 1994, increasing to 87% in 1999. It currently provides 76% of the grass cover, and 64% of the herbaceous cover, and was lightly utilized in 1999. Indian ricegrass and blue grama are the next most abundant grasses, but are decreasing in frequency. Nested frequency for all perennial grasses combined decreased in 1999. Forbs are unimportant as a forage source on this site, and provide very little protective cover.

1994 TREND ASSESSMENT

Protective ground cover has increased since 1988, with bare ground now covering 40% of the ground surface. Percent litter and cryptogamic cover have declined somewhat but vegetative cover appears to have increased. In 1988, basal vegetation cover was estimated at 4.5%. Aerial vegetation cover was estimated at 29% during the 1994 reading. Fifty-one percent of that cover comes from herbaceous vegetation which is best at holding

soil in place. There is still a considerable amount of exposed soil and some signs of soil movement, but it does not appear to be severe. Trend for soil is therefore improving.

Browse trend is down. The key species on this site is Wyoming big sagebrush. It's population density is currently stable with light to moderate use and good vigor. However, biotic and reproductive potentials are low and percent decadency has increased from 42% to 57%. The number of dead plants was estimated at 1,580 plants/acre in 1994, a very high number. The main negative aspect of this site is the extremely high number of small rabbitbrush (12,620 plants/acre). Currently, the population is mostly mature with few young and decadent. This shrub will replace Wyoming big sagebrush if current trends continue. The only positive aspect of the browse trend on this site is the 90% reduction in broom snakeweed density (13,398 to 1,400 plants/acre). Broom snakeweed is a short-lived shrub which commonly dies off in large numbers during extended drought.

Sum of nested frequency for grasses have remained fairly stable since the last reading, while those of the forbs have declined 45%. The native, bluebunch wheatgrass, increased significantly, nearly doubling in nested frequency. All other grasses encountered in 1988, declined significantly in nested frequency. Even though the sum of nested frequency for grasses and forbs combined declined, it appears in the photos that the grasses are much larger than they were previously. However, without cover data for individual species in 1988, we cannot make any direct comparisons. Trend for grasses is stable while those for forbs is down.

TREND ASSESSMENT
soil - improving
browse - down due to abundance of the increaser rabbitbrush and an increase in decadence for sagebrush
herbaceous understory - stable overall, stable for grasses but down for forbs

1999 TREND ASSESSMENT

Trend for soil is stable, but still in poor condition. Relative bare ground cover is the same as in 1994. The ratio of protective cover to bare soil has actually improved slightly Bare ground cover still remains relatively high and soil movement is noticeable with pedestaling occurring around the base of shrubs. The proportion of protective ground cover (herbaceous vegetation, cryptogams, and litter) to bare ground is marginally low, indicating high amounts of exposed bare soil. Wyoming big sagebrush, the key species, has a stable trend. The population density remains stable overall, although biotic potential and recruitment are low. Percent decadency decreased from 57% to 36%, however, the proportion of the population displaying heavy use increased from 7% to 42% in 1999. A negative aspect for browse on the site comes from the increase in stickyleaf low rabbitbrush, currently at 19,040 plants/acre. As a result, trend for browse is slightly down overall. Any continued increase in rabbitbrush could result in deleterious effects to the key species, Wyoming big sagebrush. Trend for the herbaceous understory is stable overall. Perennial grass sum of nested frequency decreased, while perennial forb nested frequency increased.

TREND ASSESSMENT
soil - stable
browse - stable for the key species, Wyoming big sage, but slightly down overall due to the increase in rabbitbrush
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 17

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'94	'99	'88	'94	'99	'94	'99
G	Agropyron spicatum	a127	b211	b235	53	70	87	10.30	8.85
G	Bouteloua gracilis	a-	c37	b30	-	11	10	1.72	1.22
G	Elymus salina	a-	b17	b20	-	6	7	.51	.87
G	Oryzopsis hymenoides	95	81	53	41	35	25	1.77	.57
G	Poa fendleriana	-	3	3	-	2	1	.01	.03
G	Sitanion hystrix	b172	a26	a7	69	10	3	.29	.04
G	Stipa columbiana	-	4	-	-	2	-	.03	-
G	Stipa comata	b15	a2	ab3	6	1	2	.03	.03
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		409	381	351	169	137	135	14.68	11.61
Total for Grasses		409	381	351	169	137	135	14.68	11.61
F	Arabis spp.	b6	a-	ab5	3	-	2	-	.01
F	Astragalus convallarius	b44	a5	b35	21	2	17	.01	.08
F	Castilleja linariaefolia	ab1	a-	b13	1	-	7	-	.20
F	Carduus nutans (a)	-	-	3	-	-	2	-	.01
F	Calochortus nuttallii	a1	a-	b16	1	-	8	-	.04
F	Collinsia parviflora (a)	-	a-	b5	-	-	3	-	.01
F	Eriogonum umbellatum	-	3	10	-	1	4	.15	.16
F	Machaeranthera grindelioides	9	10	19	6	4	10	.07	.07
F	Mammillaria spp.	1	-	-	1	-	-	-	-
F	Orthocarpus purpureo-albus (a)	b46	a-	a-	23	-	-	-	-
F	Penstemon caespitosus	c43	b23	a-	23	12	-	.11	-
F	Penstemon spp.	a-	a-	b31	-	-	16	-	.13
F	Phlox austromontana	a3	b29	b32	3	14	15	.36	.70
F	Phlox longifolia	b235	a106	a88	88	40	40	.25	.25
F	Physaria spp.	-	-	1	-	-	1	-	.00
F	Potentilla spp.	-	-	2	-	-	1	-	.03
F	Schoencrambe linifolia	a-	a-	b9	-	-	6	-	.03
F	Sphaeralcea coccinea	44	45	49	22	17	21	.35	.20
F	Thlaspi montanum	-	-	2	-	-	1	-	.00
F	Trifolium gymnocarpon	b59	a-	b47	28	-	23	-	.24
Total for Annual Forbs		46	0	8	23	0	5	0	0.02
Total for Perennial Forbs		446	221	359	197	90	172	1.31	2.18
Total for Forbs		492	221	367	220	90	177	1.31	2.21

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 16B, Study no: 17

Type	Species	Strip Frequency ⁽94	⁽99	Average Cover % ⁽94	⁽99
B	Artemisia nova	4	3	.76	.38
B	Artemisia tridentata wyomingensis	74	73	5.03	7.57
B	Atriplex canescens	0	0	-	-
B	Ceratoides lanata	0	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	90	95	6.42	8.37
B	Echinocereus spp.	0	3	-	.00
B	Gutierrezia sarothrae	42	27	.17	.30
B	Opuntia spp.	17	19	.22	.37
B	Pinus edulis	0	0	.00	-
B	Sclerocactus	0	1	-	-
Total for Browse		227	221	12.63	17.00

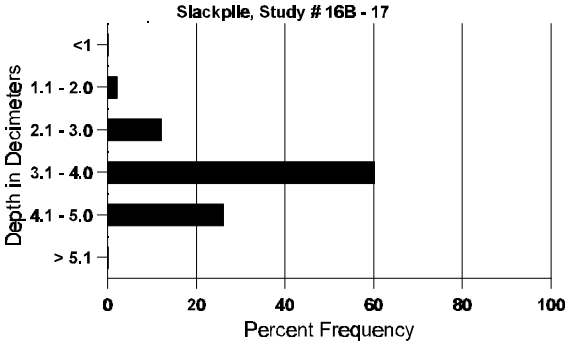
BASIC COVER --
Herd unit 16B, Study no: 17

Cover Type	Nested Frequency ⁽94	⁽99	Average Cover % '88	'94	'99
Vegetation	327	324	4.50	28.70	30.32
Rock	16	1	0	.06	.00
Pavement	19	4	.50	.09	.01
Litter	377	356	29.25	25.67	21.25
Cryptogams	138	216	10.00	2.78	9.93
Bare Ground	354	351	55.75	40.50	42.94

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 17, Study Name: Slackpile

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
18.0	56.0 (18.1)	7.5	39.3	34.2	26.6	1.5	5.1	44.8	0.6

Stoniness Index



PELLET GROUP DATA --
Herd unit 16B, Study no: 17

Type	Quadrat Frequency '94	Quadrat Frequency '99	Pellet Transect Days Use/Acre (ha) '99
Rabbit	8	54	n/a
Elk	4	2	0
Deer	48	59	65 (161)
Cattle	1	6	23 (57)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 17

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	1	3	-	-	-	-	-	-	-	4	-	-	-	80	16	34	4
	99	-	3	-	-	-	5	1	-	-	9	-	-	-	180	7	14	9
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	1	1	-	-	-	-	-	-	-	1	-	-	1	40			2
	99	-	-	-	-	-	2	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	50%	00%	13%	+27%
'99	27%	64%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'88	0		0%
	'94	160		25%
	'99	220		18%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	88	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	4	6	2	-	-	-	-	-	-	12	-	-	-	800			12
	94	2	1	-	-	-	-	-	-	-	3	-	-	-	60			3
	99	8	2	-	-	1	1	-	-	-	12	-	-	-	240			12
M	88	1	6	7	-	-	-	-	-	-	14	-	-	-	933	13	18	14
	94	34	21	1	1	-	-	-	-	-	55	-	-	2	1140	16	23	57
	99	4	6	17	2	20	23	5	-	-	77	-	-	-	1540	18	27	77
D	88	-	6	11	-	-	-	2	-	-	17	-	2	-	1266			19
	94	19	51	8	-	-	1	1	-	-	64	-	-	16	1600			80
	99	10	4	7	-	10	11	9	-	-	35	2	-	14	1020			51
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1580			79
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	1940			97

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	40%	44%	04%	- 7%
'94	52%	07%	13%	+ 0%
'99	31%	42%	10%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	2999	Dec:	42%
	'94	2800		57%
	'99	2800		36%

Atriplex canescens																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	47	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

Ceratoides lanata																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	100%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
S	88	30	-	-	-	-	-	-	-	-	30	-	-	-	2000			30
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	27	-	-	-	-	-	1	-	-	28	-	-	-	560			28
Y	88	657	7	-	-	-	-	-	-	-	664	-	-	-	44266			664
	94	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
	99	156	9	-	-	2	6	-	-	-	173	-	-	-	3460			173
M	88	118	20	1	2	-	-	-	-	-	141	-	-	-	9400	6	9	141
	94	598	-	-	12	-	-	-	-	-	610	-	-	-	12200	5	12	610
	99	502	206	29	-	-	26	12	-	-	775	-	-	-	15500	4	9	775
D	88	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	99	4	-	-	-	-	-	-	-	-	1	-	-	3	80			4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	03%	.12%	00%	-77%
'94	00%	00%	.15%	+34%
'99	23%	06%	.31%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	53799	Dec:	0%
	'94	12620		0%
	'99	19040		0%

Echinocereus spp.																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	3	-	-	-	60	2	4	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	37	-	-	-	-	-	-	-	-	37	-	-	-	2466			37
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	88	157	-	-	-	-	-	-	-	-	157	-	-	-	10466	7	7	157
	94	70	-	-	-	-	-	-	-	-	70	-	-	-	1400	8	5	70
	99	99	-	-	-	-	-	-	-	-	99	-	-	-	1980	4	3	99
D	88	7	-	-	-	-	-	-	-	-	5	-	1	1	466			7
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	.99%	-90%
'94	00%	00%	00%	+30%
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	13398	Dec:	3%
	'94	1400		0%
	'99	2000		0%

Opuntia spp.																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	4	-	-	-	-	-	-	-	-	3	-	1	-	266			4
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
M	88	2	-	-	-	-	-	-	-	-	1	-	1	-	133	3	7	2
	94	22	-	-	-	-	-	-	-	-	22	-	-	-	440	4	13	22
	99	16	-	-	-	-	-	-	-	-	16	-	-	-	320	3	13	16
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	4	-	1	1	-	-	-	-	-	1	-	-	5	120			6
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	33%	+ 9%
'94	00%	00%	00%	+19%
'99	00%	04%	19%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	399	Dec:	0%
	'94	440		0%
	'99	540		22%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'94	0			-
'99	0			-

Sclerocactus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	-
'94	0		-
'99	20		-